REMARKS

Claims 1-22 and 48-58 are pending. Claims 1, 50-52, 55, and 58 are amended and claim 4 is canceled, without prejudice. No new matter has been added by virtue of the amendments, support for the amendments being found in the original claims and throughout the originally filed specification, claims, and figures.

1. 35 U.S.C. §112 Rejections

Claims 4 and 6 are rejected under 35 U.S.C. §112, second paragraph. The Office asserts that PEGDA "is not capable of significant *preferential* absorption on a substrate as shown in the present specification (example 2 at page 19 of the present specification)." Applicants respectfully traverse.

Claim 4 recites only that the difunctional surface-modifying molecules comprise difunctional acrylate molecules. Nowhere does claim 4 specify that the difunctional surface-modifying molecule is polyethylene glycol diacrylate (PEGDA).

As set forth in the application, the difunctional surface-modifying molecules can comprise difunctional acrylate molecules, such as, for example, ethoxylated (30) bisphenol A diacrylates (see e.g. page 4, lines 21-24). Such difunctional acrylates are capable of significant adsorption as demonstrated, for example, in Examples 1-7.

Claim 6 recites that the hydrophobic portion of the difunctional surface-modifying molecules is a hydrophobic alkyl, aromatic group, or olefinic hydrocarbon group. Nowhere does claim 6 specify that the difunctional surface-modifying molecule is polyethylene glycol diacrylate (PEGDA).

Applicants respectfully submit that the claimed subject matter of claims 4 and 6 are not in conflict with claim 1 and that the Office's assertions are misplaced. Reconsideration and withdrawal of the rejection is respectfully requested. Applicants further note that claim 4 is canceled herein, without prejudice.

2. 35 U.S.C. §102/103 Rejections

Callahan

Claims 1-19, 21, 22, 48-52, and 55-57 are rejected under 35 U.S.C. §102(b) or alternatively §103(a) over Callahan et al (U.S. Patent No. 4,976,897). Applicants respectfully traverse.

Independent claim 1, as amended, recites a composite porous membrane comprising a hydrophobic substrate coated difunctional surface-modifying molecules, each difunctional surface-modifying molecule comprising a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion. As set out, the difunctional acrylate molecules consist of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane. As further set out, the surface-modifying molecules are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane.

It is respectfully submitted that Callahan at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

According to Callahan, membranes are coated with a UV curable resin. the UV curable resin includes a UV reactive unsaturated polymeric material, a photocatalyst, and, optionally, a reactive diluent. As set out in the Office action on page 7, Callahan describes UV curable resins comprising Celrad 3700-20T which is a composition of 20% trimethyol triacrylate and diacrylate ester bisphenol A epoxy resins. It is respectfully submitted that trimethyol triacrylate is trifunctional. Further, Celrad 3700-20T is a blend of two types of materials, as are the other materials used by Callahan.

Thus, it is respectfully submitted that claim 1, and all claims dependent therefrom, are patentable over Callahan.

Independent claim 50 recites a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, each difunctional surface-modifying molecule comprising a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion. As set out, the substrate is coated by flowing a reagent solution through the substrate to coat the substrate, the reagent solution comprising the difunctional surface-modifying molecules and a photoinitiator. The difunctional surface-modifying molecules are preferentially absorbed on the substrate surface and, thereafter, the surface-modifying molecules are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane. As further set out, the pore sizes of the coated composite porous membrane is substantially the same as the pore size of the composite porous membrane before coating.

Callahan, on the other hand, describes a membrane that is coated using a UV resin mixture having high viscosity which allows for coating and curing of the UV resin mixture before any significant wetting or pore filling occurs. As set out by Callahan, adequate bonding is surprisingly achieved using these high viscosity resins because it was previously believed that "pore penetration must occur to achieve adequate bonding". (See col. 4, line 54 – col. 5, line 2). Thus, Callahan provides coated membranes wherein filling of the pores is prevented by the use of UV curable resins having high viscosities, e.g. at least 35,000 cp, which prevents the resins from passing into the pores (see col. 5, lines 3-7).

Clearly, Callahan at least fails to teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules wherein the substrate is coated by flowing a reagent solution comprising the difunctional surface-modifying molecules and a photoinitiator through the substrate to coat the substrate, wherein the pore sizes of the coated composite porous membrane is substantially the same as the pore size of the composite porous membrane before coating. Callahan specifically teaches the use of highly viscous materials that do not fill the pores – thereby avoiding wicking up of the pores and reduced flux – and, thus, teaches away from Applicants' claimed membranes.

Thus, it is respectfully submitted that claim 50, and all claims dependent therefrom, are patentable over Callahan. Reconsideration and withdrawal of the rejection is respectfully requested.

Applicants recite, in independent claim 58, a composite porous membrane comprising a hydrophobic substrate coated with ethoxylated (30) bisphenol A diacrylates, each ethoxylated (30) bisphenol A diacrylate comprising a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion, wherein the ethoxylated (30) bisphenol A diacrylates are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane.

Callahan, at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with ethoxylated (30) bisphenol A diacrylates. Rather, Callahan describes, for example, Celrad 3700, which is a diacrylate ester of bisphenol A **epoxy resin**. As set out in TABLE 1 of Callahan, this material has a viscosity of 1,000,000 cp. Callahan's material, which contains an epoxy component, is very different than Applicants' claimed ethoxylated (30) bisphenol A diacrylates, which have a significantly lower viscosity of 680 cp (as shown on the attached product specification sheets). The other materials set out by Callanan, Celrad 3700-20T, Celrad 3700-25R, and Celrad 3700-15S are dilutions of Celrad 3700 with various materials and, likewise, are very different materials than Applicants' claimed ethoxylated (30) bisphenol A diacrylates. Clearly, nowhere does Callahan teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with ethoxylated (30) bisphenol A diacrylates.

Thus, claim 58 is patentable over Callahan. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham

Claims 1-9, 12-17, 19, 21, 22, and 48-58 are rejected under 35 U.S.C. §102(b), or alternatively §103(a) over Witham (U.S. Patent No. 6,193,077). Applicants respectfully traverse.

Witham describes a membrane having a coating comprising a high molecular weight polyalkylene oxide (PEO) and a polymerizable polyfunctional monomer thereon. According to Witham, the use of combinations of PEO and polymerizable polyfunctional monomer impart permanent water wettability to a membrane without restricting flow rate and without cracking (see, e.g. col. 7, lines 10-17, Examples 1-3).

Witham clearly does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, it is respectfully submitted that claim 1, and all claims dependent therefrom, are patentable over Witham.

Witham, further, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules wherein the substrate is coated by flowing a reagent solution comprising the difunctional surface-modifying molecules and a photoinitiator through the substrate to coat the substrate, wherein the pore sizes of the coated composite porous membrane is substantially the same as the pore size of the composite porous membrane before coating, as recited in independent claim 50.

According to Witham, solutions containing the PEO and polymerizable polyfunctional monomer are deposited over the surface of the membranes (see, e.g. Example 1). Nowehre does Witham teach or suggest coated membranes coated by flowing a reagent solution comprising difunctional surface-modifying molecules and a photoinitiator through the substrate to coat the substrate, wherein the pore sizes of the coated composite porous membrane is substantially the

same as the pore size of the composite porous membrane before coating, or that such coated membranes could substantially retain their pore size after coating.

Thus, it is respectfully submitted that claim 50, and all claims dependent therefrom, are patentable over Witham. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham, further, at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with ethoxylated (30) bisphenol A diacrylates, each ethoxylated (30) bisphenol A diacrylate comprising a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion, wherein the ethoxylated (30) bisphenol A diacrylates are crosslinked to form a crosslinked hydrophilic polymeric network at the surface of the membrane, as recited in independent claim 58.

As set out above, Witham describes a membrane having a coating comprising a combination of a high molecular weight polyalkylene oxide (PEO) and a polymerizable polyfunctional monomer thereon. Such combinations of PEO and polymerizable polyfunctional monomer are specifically selected to impart permanent water wettability to a membrane without restricting flow rate and without cracking.

Thus, claim 58 is patentable over Witham. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham and Steuck

Claim 20 is rejected under 35 U.S.C. §103(a) over Witham and Steuck et al (U.S. Patent No. 4,618,533). Applicants respectfully traverse.

As set forth above, Witham at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1 from which claim 20 depends.

Steuck does not remedy these deficiencies. Steuck is cited for allegedly describing porous membranes that include polyether sulfone and polyvinyldiene fluoride. Steuck, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Witham and Steuck. Claim 20 depends from claim 1 and, thus, also is patentable over Witham and Steuck. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham and Hu

Claim 18 is rejected under 35 U.S.C. §103(a) over Witham and Hu et al. (U.S. Patent No. 5,209,849). Applicants respectfully traverse.

As set forth above, Witham at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1 from which claim 18 depends.

Hu does not remedy these deficiencies. Hu is cited for allegedly describing the use of DROCUR® 1173 as a photoinitiator. Hu, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Witham and Hu. Claim 18 depends from claim 1 and, thus, also is patentable over Witham and Hu. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham and Wu

Claim 10 is rejected under 35 U.S.C. §103(a) over Witham and Wu et al. (WO 00/50161). Applicants respectfully traverse.

As set forth above, Witham at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1 from which claim 10 depends.

Wu does not remedy these deficiencies. Wu is cited for allegedly describing a crosslinked acrylic coating having a pendant cationic group linked to the coating backbone. Wu, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Witham and Wu. Claim 10 depends from claim 1 and, thus, also is patentable over Witham and Wu. Reconsideration and withdrawal of the rejection is respectfully requested.

Witham and Hou

Claim 11 is rejected under 35 U.S.C. §103(a) over Witham and Hou et al. (WO 00/50160, corresponding to U.S. Patent No. 6,783,937). Applicants respectfully traverse.

As set forth above, Witham at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1 from which claim 11 depends.

Hou does not remedy these deficiencies. Hou is cited for allegedly describing a crosslinked acrylic coating having fixed negative charge. Hou, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Witham and Hou. Claim 11 depends from claim 1 and, thus, also is patentable over Witham and Hou. Reconsideration and withdrawal of the rejection is respectfully requested.

Charkoudian et al

Claims 1-3, 5-7, 9, 12, 14, 16-22, and 48-57 are rejected under 35 U.S.C. §102(e) or alternatively §103(a) over Charkoudian et al (U.S. Publication No. 2003/0077435). Applicants respectfully traverse.

Charkoudian describes membranes coated with a polymeric terpolymer. Such polymeric terpolymers are coated thereon by contacting the surface of the membranes with a solution containing monofunctional and polyfunctional monomers, followed by polymerization.

Charkoudian does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1.

Charkoudian further does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, each difunctional surface-modifying molecule comprising a hydrophobic portion preferentially associated with the substrate and a hydrophilic portion, wherein the substrate is coated by flowing a reagent solution through the substrate to coat the substrate, the reagent solution comprising the difunctional surface-modifying molecules and a photoinitiator, as recited in independent claim 50.

Thus, independent claims 1 and 50, and all claims dependent therefrom, are patentable over Charkoudian. Reconsideration and withdrawal of the rejection is respectfully requested.

Charkoudian and Wu

Claim 10 is rejected under 35 U.S.C. §103(a) over Charkoudian and Wu. Applicants respectfully traverse.

As set forth above, Charkoudian at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1.

Wu does not remedy these deficiencies. Wu is cited for allegedly describing a crosslinked acrylic coating having a pendant cationic group linked to the coating backbone. Wu, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Charkoudian and Wu. Claim 10 depends from claim 1 and, thus, also is patentable over Charkoudian and Wu. Reconsideration and withdrawal of the rejection is respectfully requested.

Charkoudian and Hou

Claim 11 is rejected under 35 U.S.C. §103(a) over Charkoudian and Hou. Applicants respectfully traverse.

As set forth above, Charkoudian at least does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate

monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1.

Hou does not remedy these deficiencies. Hou is cited for allegedly describing a crosslinked acrylic coating having fixed negative charge. Hou, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Charkoudian and Hou. Claim 11 depends from claim 1 and, thus, also is patentable over Charkoudian and Hou. Reconsideration and withdrawal of the rejection is respectfully requested.

Remigy et al

Claims 1-7, 9-14, 21, 22, and 48-57 are rejected under 35 U.S.C. §102(e) or alternatively §103(a) over Remigy et al (U.S. Publication No. 2002/0161066). Applicants respectfully traverse.

Remigy describes membranes coated with a grafting face formed from a grafting composition containing at least one monomer and at least one crosslinking agent, wherein the grafting composition is "free from photoinitiating agent" (see, e.g. [0019], [0021]).

Remigy does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1.

Remigy further does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules, each difunctional surface-modifying molecule comprising a hydrophobic portion preferentially associated with the

substrate and a hydrophilic portion, wherein the substrate is coated by flowing a reagent solution through the substrate to coat the substrate, the reagent solution comprising the difunctional surface-modifying molecules and a photoinitiator, as recited in independent claim 50.

Thus, independent claims 1 and 50, and all claims dependent therefrom, are patentable over Remigy. Reconsideration and withdrawal of the rejection is respectfully requested.

Remigy and Steuck

Claims 19 and 20 are rejected under 35 U.S.C. §103(a) over Remigy and Steuck. Applicants respectfully traverse.

As set forth above, Remigy does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane, as recited in independent claim 1.

Steuck does not remedy these deficiencies. Steuck is cited for allegedly describing porous membranes that include polyether sulfone and polyvinyldiene fluoride. Steuck, however, does not teach or suggest a composite porous membrane comprising a hydrophobic substrate coated with difunctional surface-modifying molecules consisting of a difunctional acrylate monomer, wherein the difunctional acrylate monomer comprise greater than about 90% of the molecules associated with the membrane.

Thus, claim 1 is patentable over Remigy and Steuck. Claims 19 and 20 depend from claim 1 and, thus, also are patentable over Remigy and Steuck. Reconsideration and withdrawal of the rejection is respectfully requested.

CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

It is believed that no fees are required for consideration of this response. However, if for any reason the fee paid is inadequate or credit is owed for any excess fee paid, the Office is hereby authorized and requested to charge Deposit Account No. **04-1105**.

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Respectfully submitted,

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